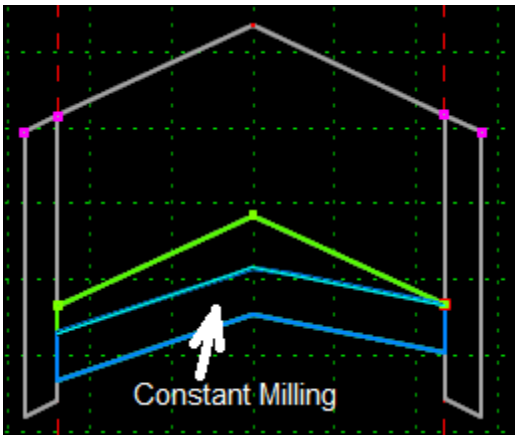
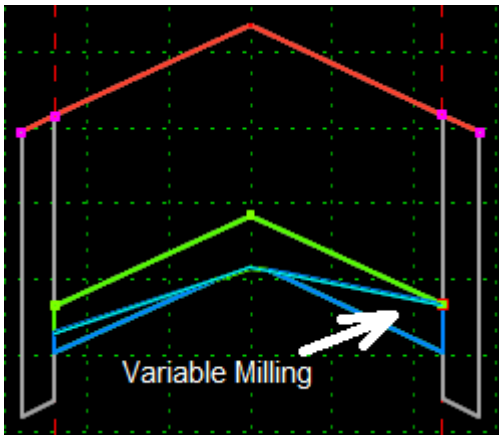
Corridor Modeling – Variable Overlays, Milling, Constant Overlays (03-2012)

Corridor Modeling's Overlay tools allows for establishing optimal grades for overlays based on improving superelevation or constant overlays. It also allows you to view existing slopes at any increment specified along the road and establish new slopes in station ranges. Milling components are also available to allow for constant or variable milling. Quantities for overlay and milling components as well as a design grade are available as output.

Templates and template components available are based on a constant milling depth or a variable milling depth.





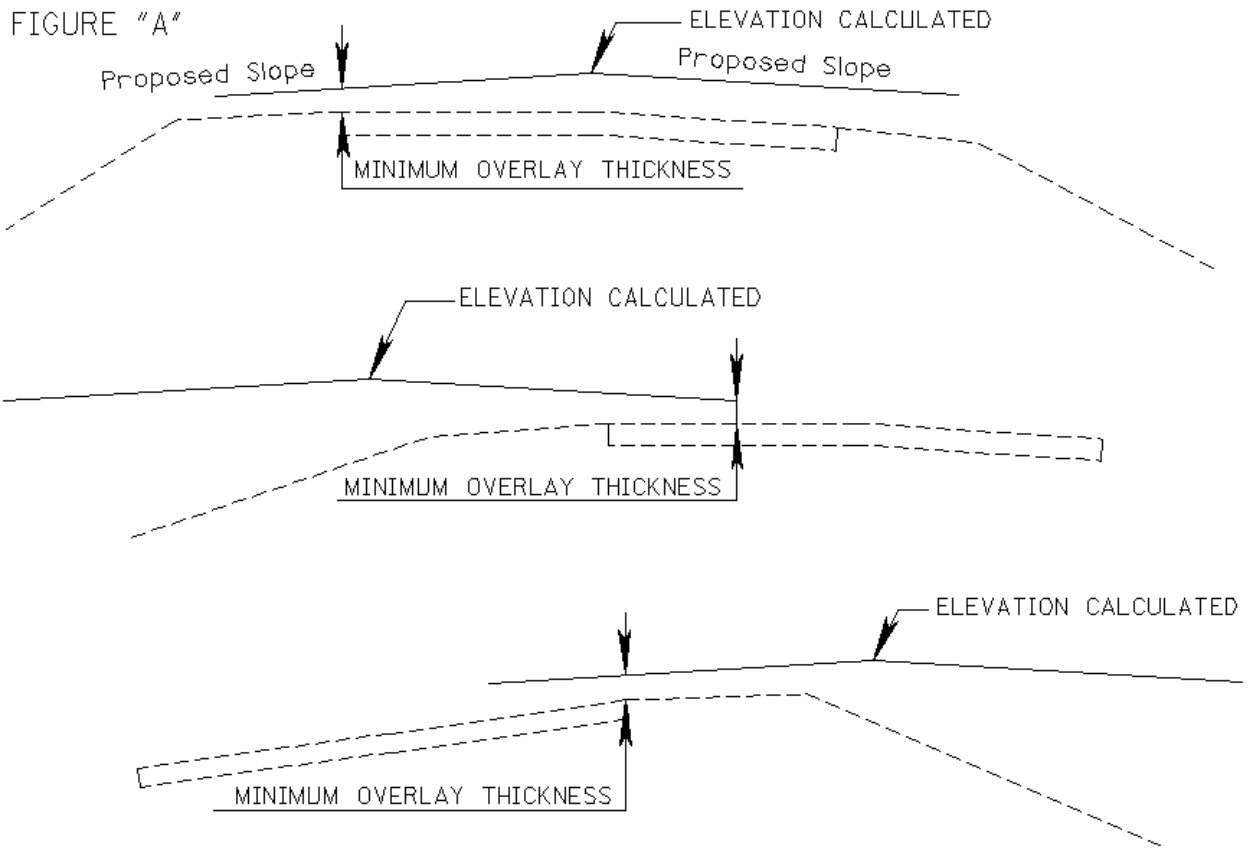
The following steps are the instructions for finding the critical point (elevation) of Existing X-Sections for a

Minimum Overlay and creating a Proposed Profile from these Critical Points.

Overlays

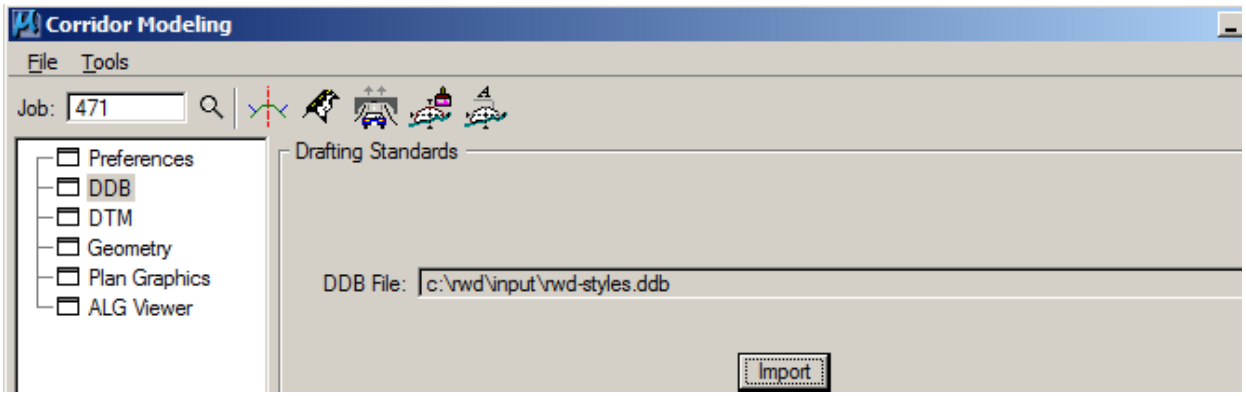
Pre-STEPS – Corridor Modeling Dialog

1. If you intent is to improve existing slopes based on current superelevation standards, you should Calculate Superelevation with GeoPak prior to beginning the CM process. Since you don't know the proposed profile yet, you would use your existing profile for the profile required in the superelevation calculation process. This will be discussed more in the steps below. Below are some example figures of calculating a new grade when you're wanting to improve to current superelevation standards.

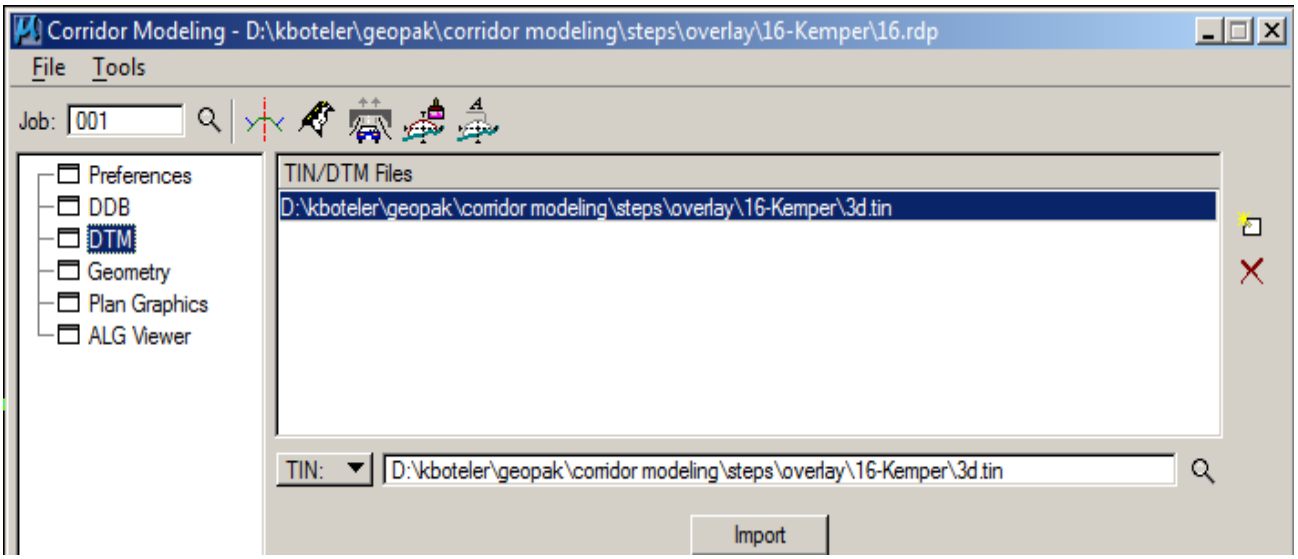


STEPS

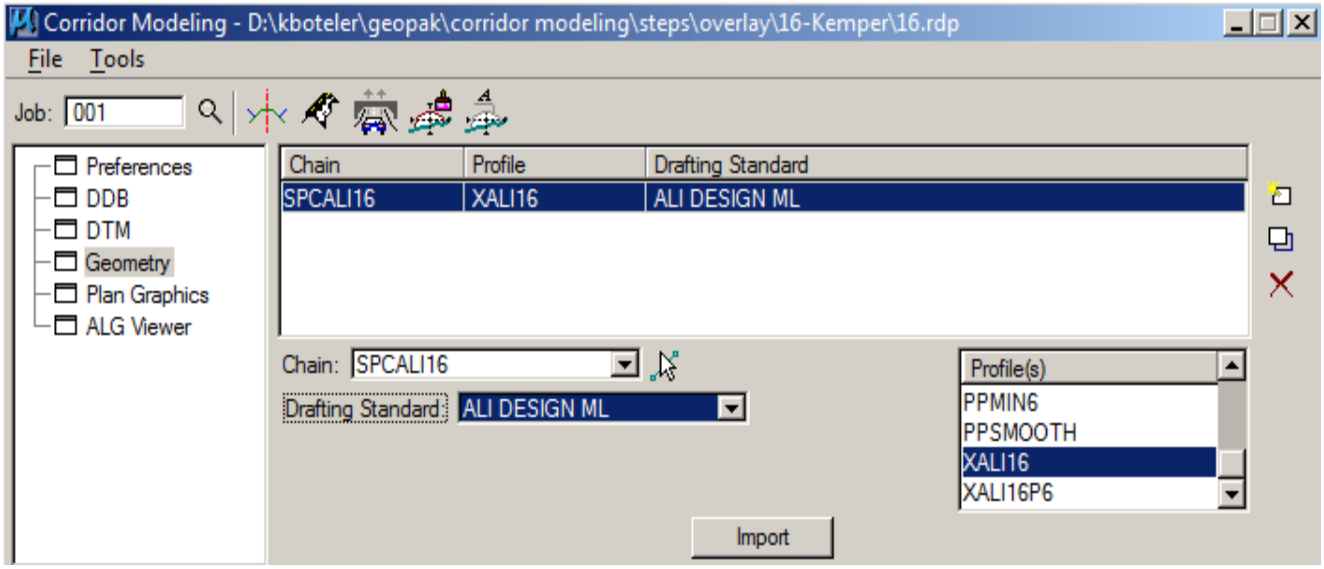
1. Tag DDB and import Drafting Standards



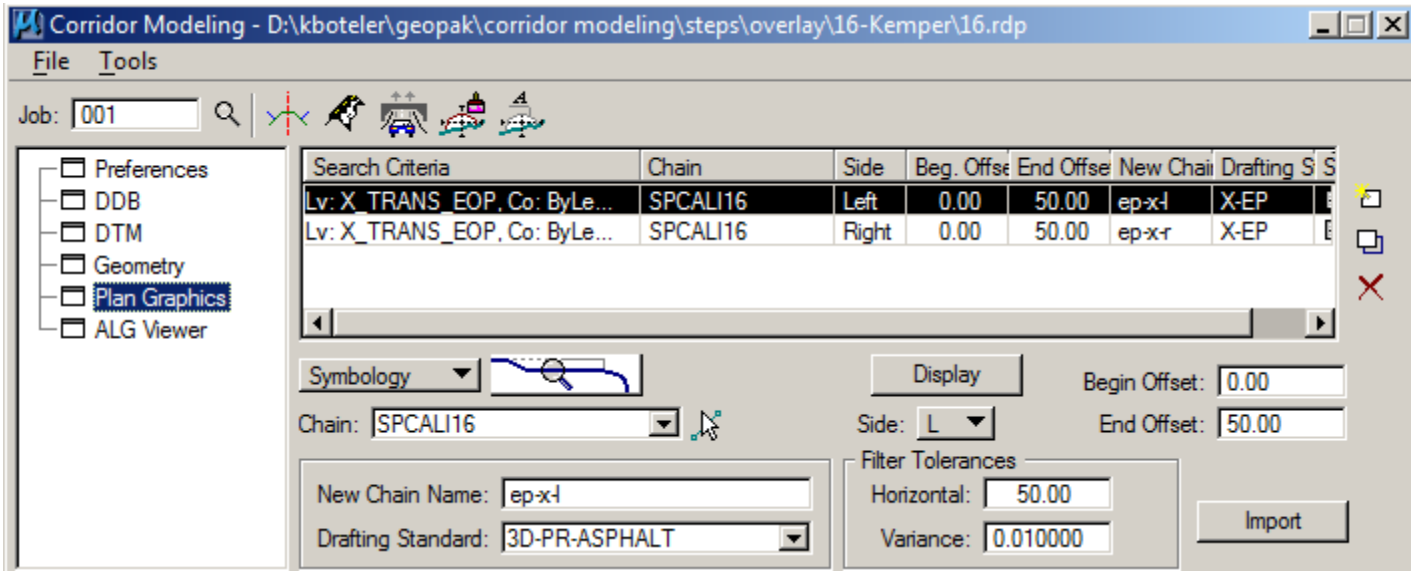
2. Import your existing GeoPak TIN.



3. Add Geometry – This is where you add your chain(s) & profile(s). You will choose your existing profile or not choose a profile in this step.

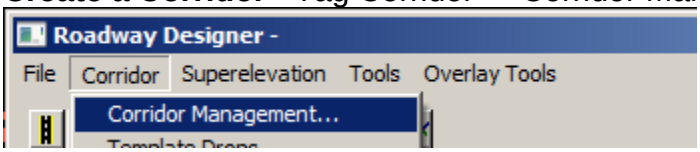


4. Plan Graphics – Plan graphics that you wish to associate with a Template point are imported here. Tag Symbology & match an element, choose a chain, specify the maximum offset (End Offset) you want to search for the element, enter the New Chain Name, & choose the side L or R of the chain you want to import. You'll need existing EP Left & Right as shown below for Overlay. You can also go ahead and import EP, Shoulder, etc. although not shown here.

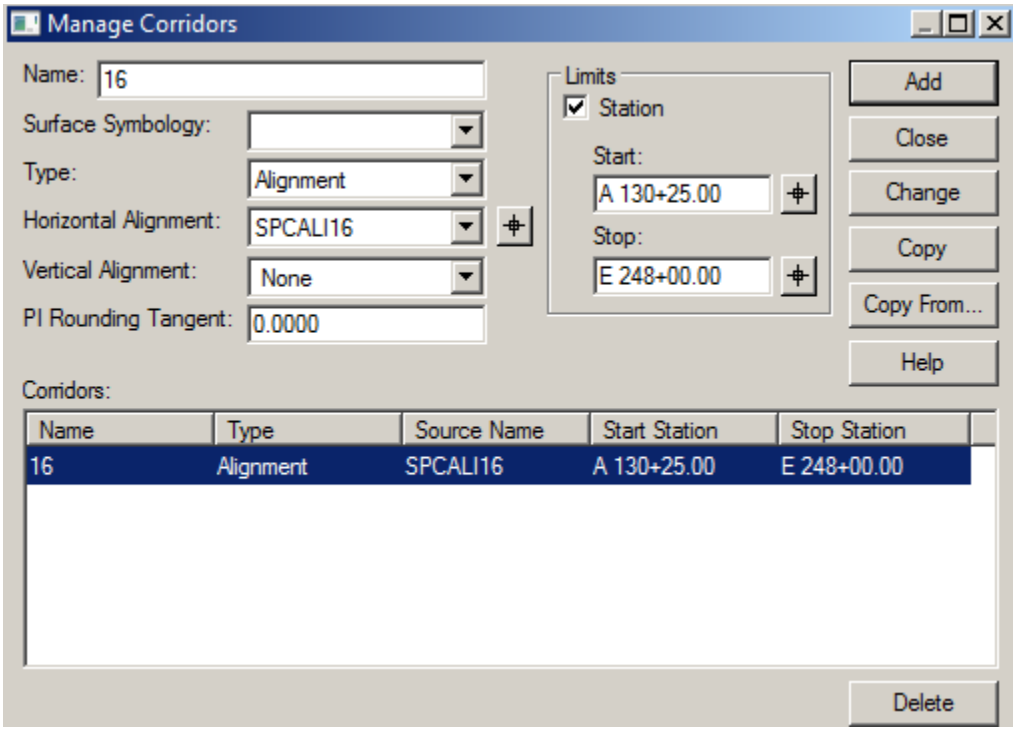


STEPS – Roadway Designer

1. **Create a Corridor** - Tag Corridor -> Corridor Management



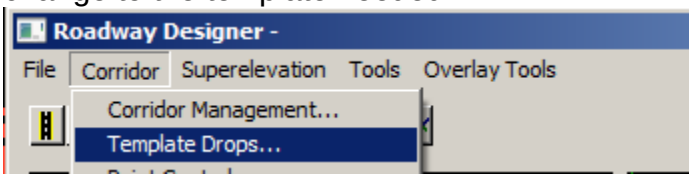
Enter a name for the corridor (Overlay in this example), choose your alignment, tag add, and then close.

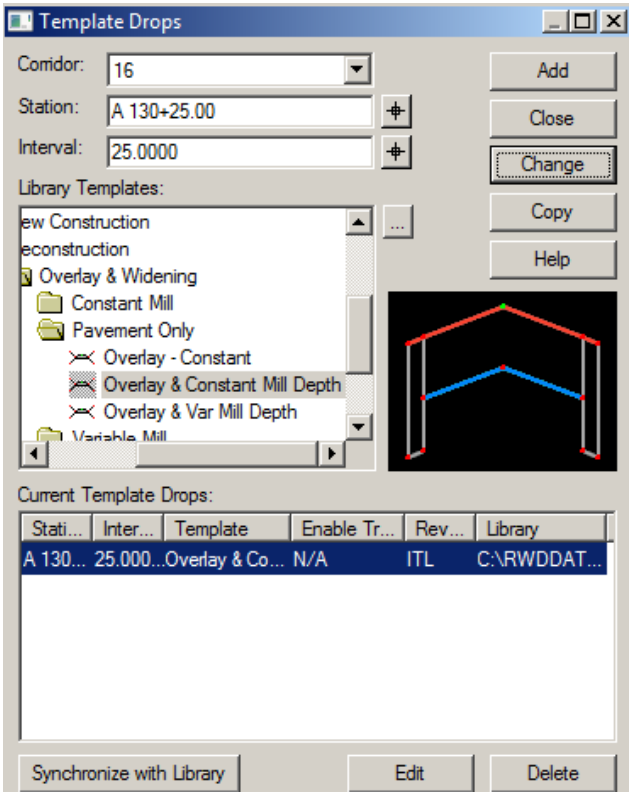


NOTE: We'll be determining the Profile in the steps below, so at this time, Vertical Alignment is set to None.

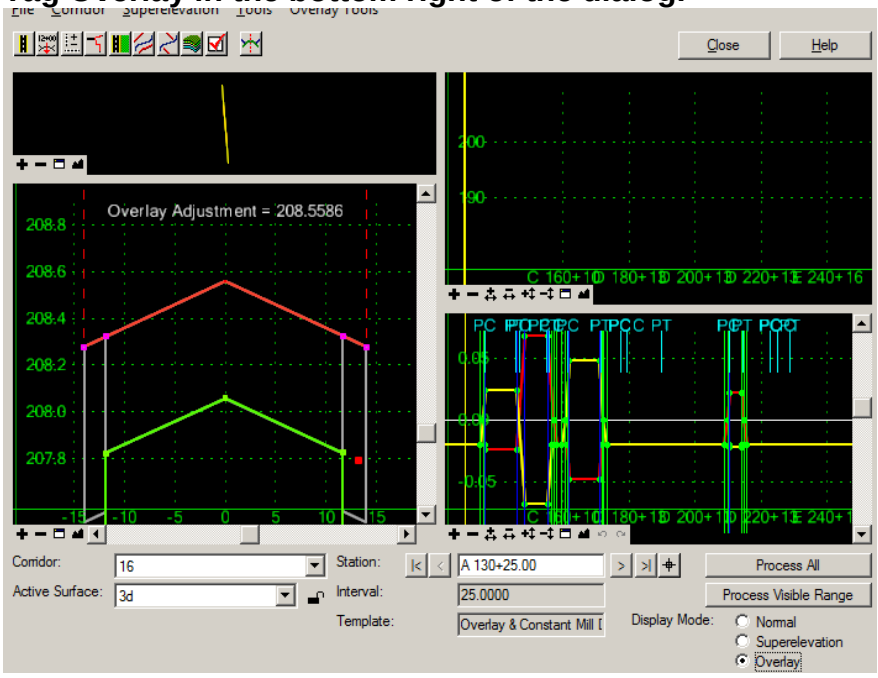
2. **Choose a Template.** Choose the template and tag Add. In the example below, I just choose

Pavement Only which will be used to set a grade. When this grade is set, I'll come back and change to the template needed.



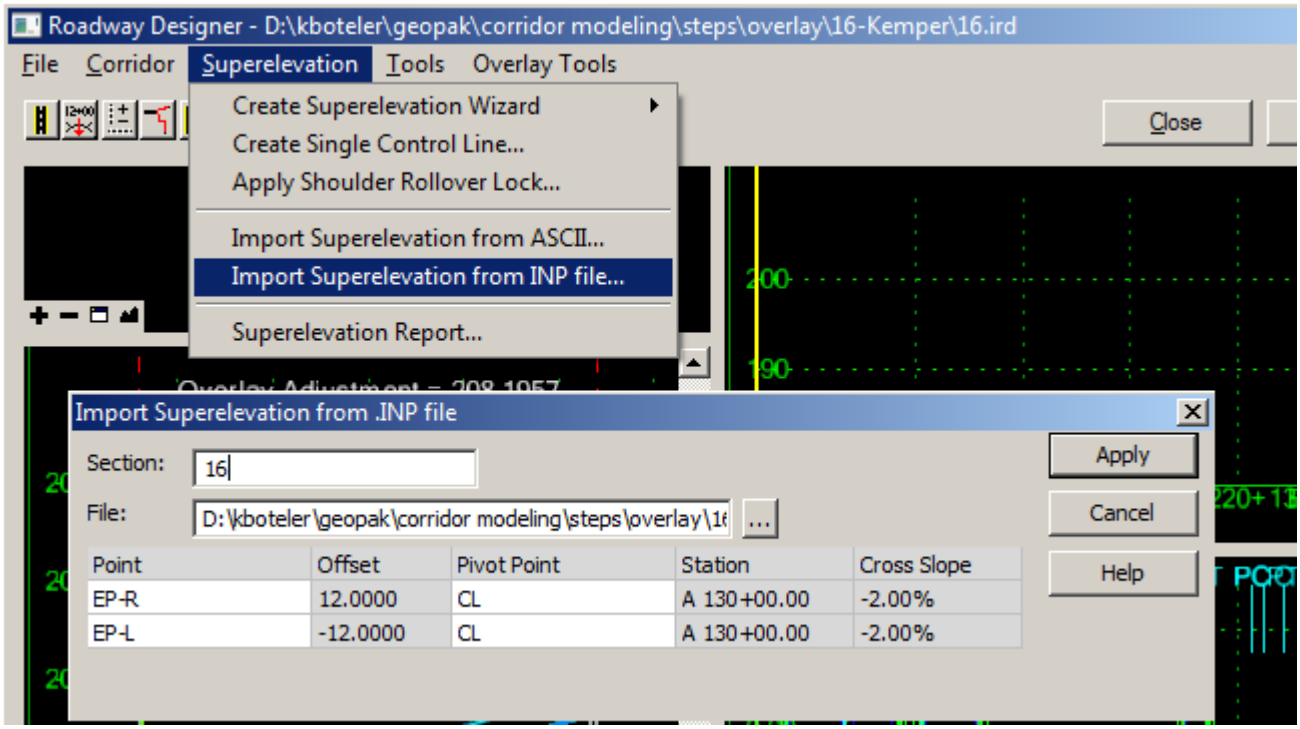


3. **Tag Overlay in the bottom right of the dialog.**



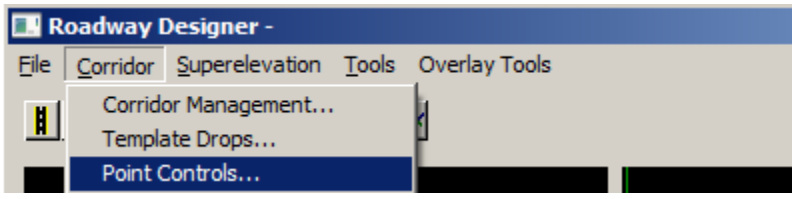
(Skip to the "**CONSTANT OVERLAY" area below** if you are not improving the design slope to current superelevation standards or are specifying Design Slopes in specific station ranges.)

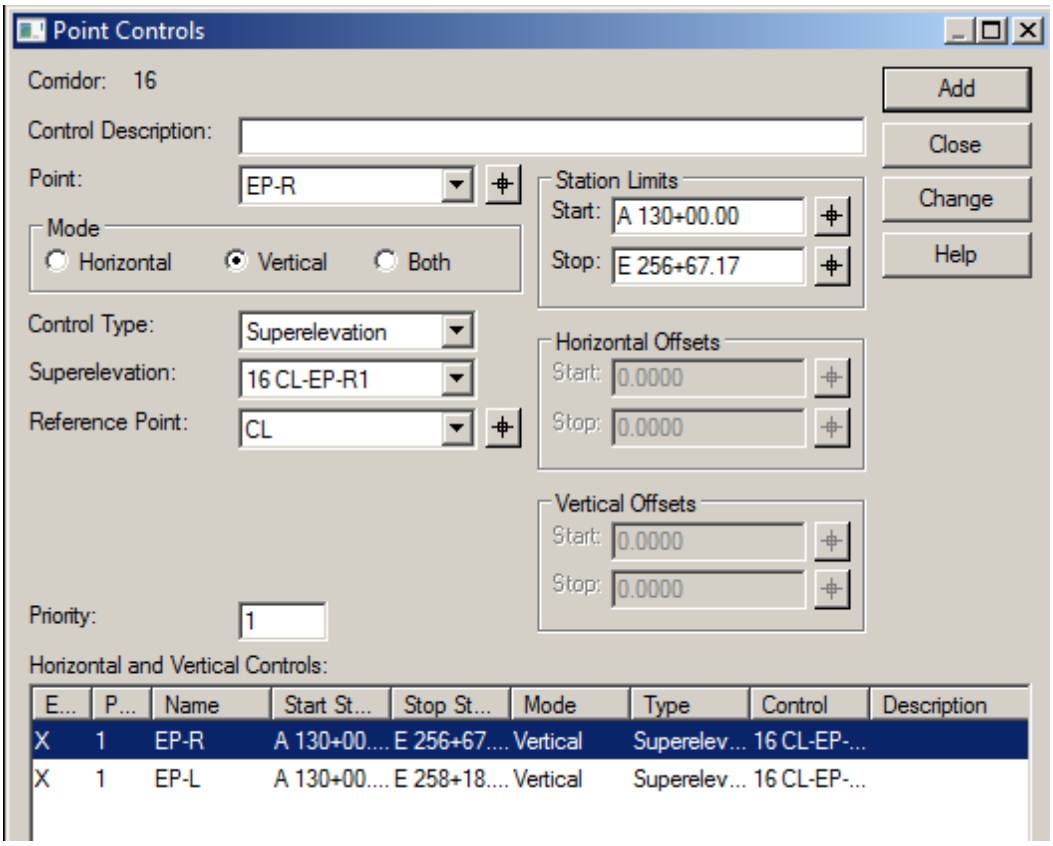
4. Superelevation



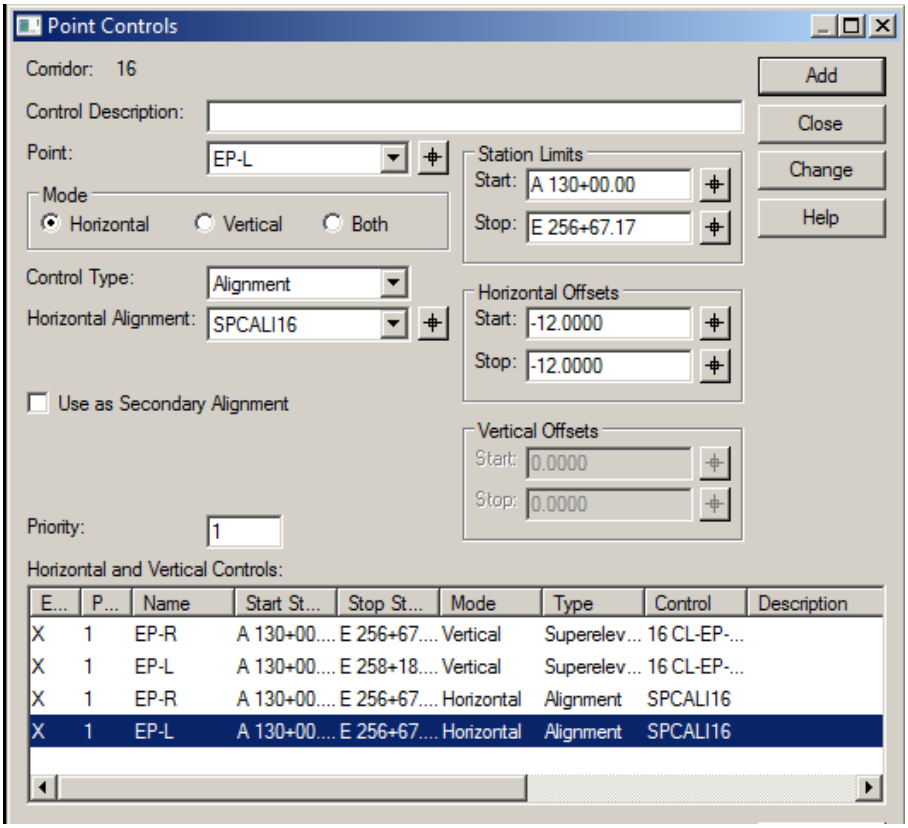
Note: You have to choose the Point, enter a section name, and then tag Apply. You can use your existing profile name in the input file since we're establishing a proposed.

5. Point Controls –

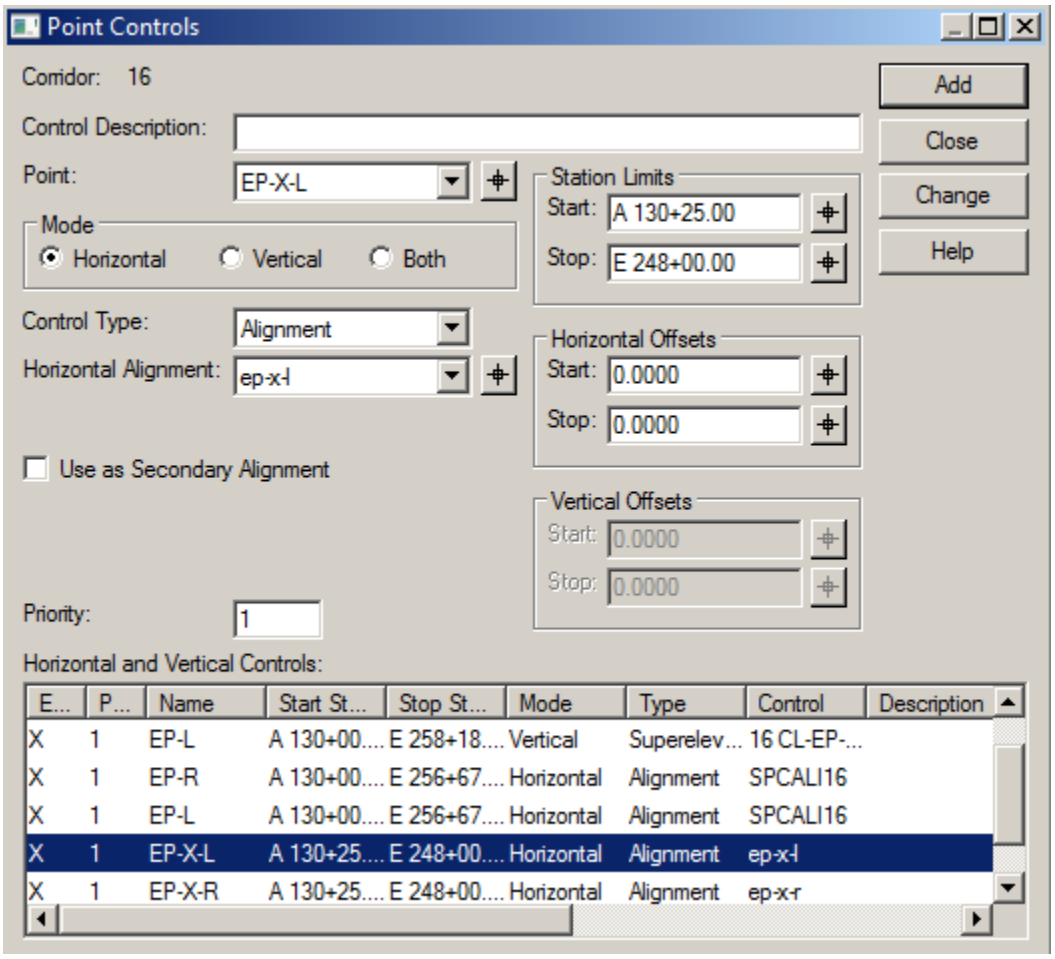




Super shows up but now we'll tie the Template Points EP-L & EP-R to their correct Horizontal location. In lieu of a constant offset, you could import the Proposed EP's as alignments from Plan Graphics or you could associate the Proposed EP's with the existing EP alignments imported.

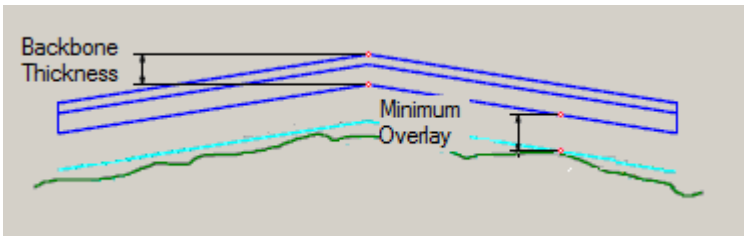


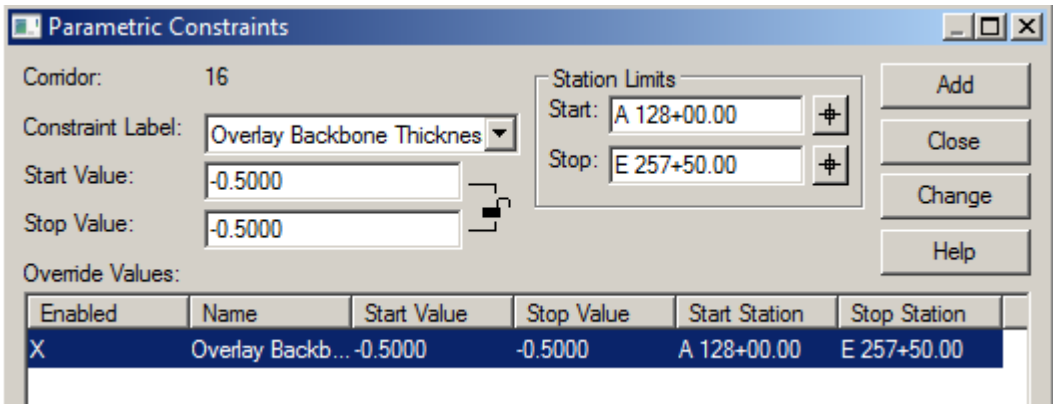
Now we'll tie the Template existing EP's to the imported existing alignments.



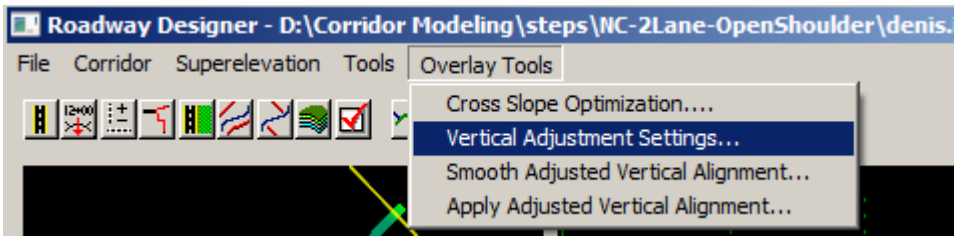
6. Parametric Constraints

At this time, the only parametric constraint that is required to be set is the Overlay Backbone Thickness (Pavement Thickness above Variable Overlay Thickness) although you can go ahead and set others if you wish.



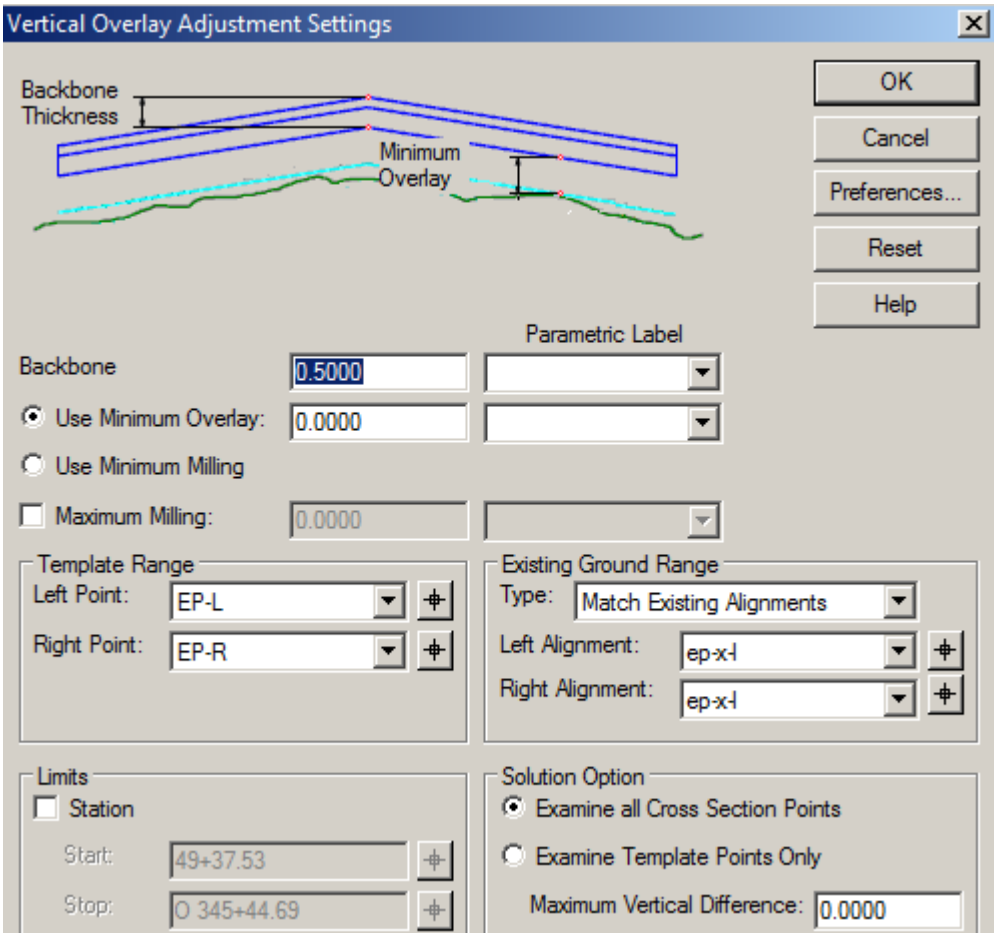


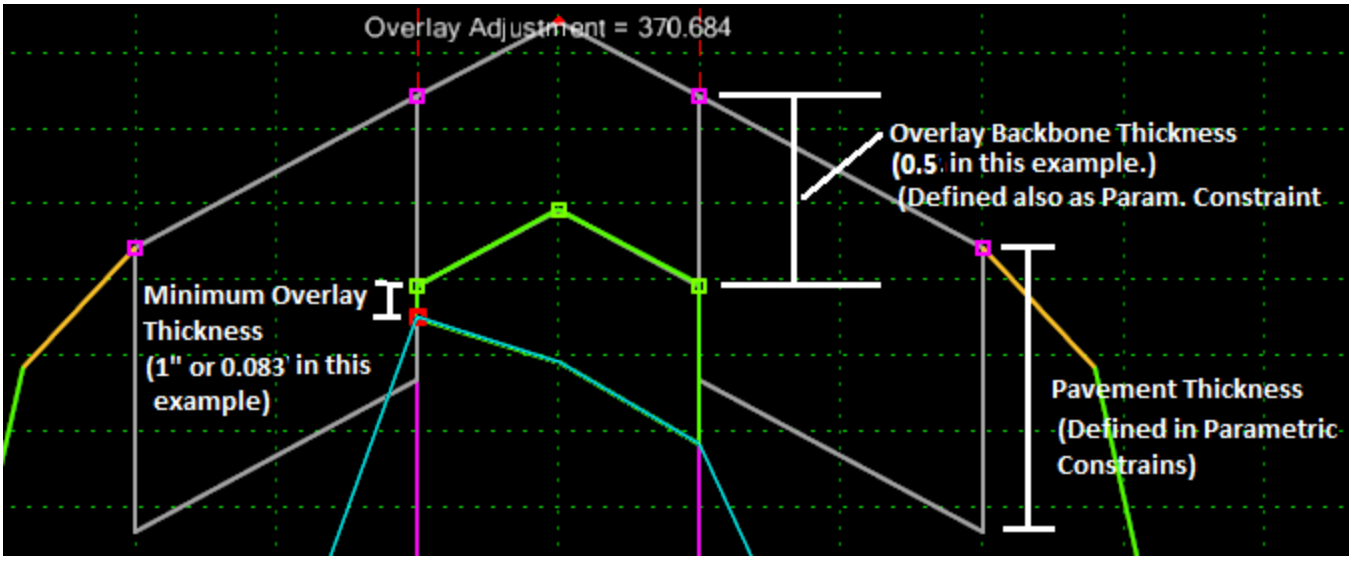
7. **Tag Overlay Tools – Vertical adjustment Settings**



8. **Set the following and tag OK.**

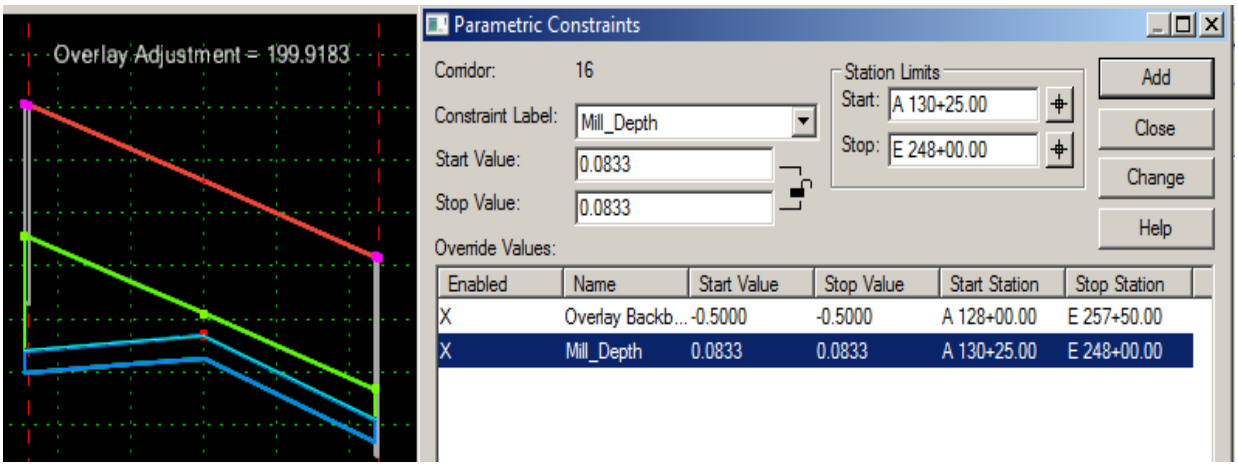
Enter the backbone thickness (Same as you did in Parametric Constraints) and the minimum overlay thickness. You can enter 1" and the dialog will convert to decimals (0.083). Choose the template range which will be Existing EP's (EP-X-L & EP-X-R) or you can specify offsets (i.e. 11') under Existing Ground Range.



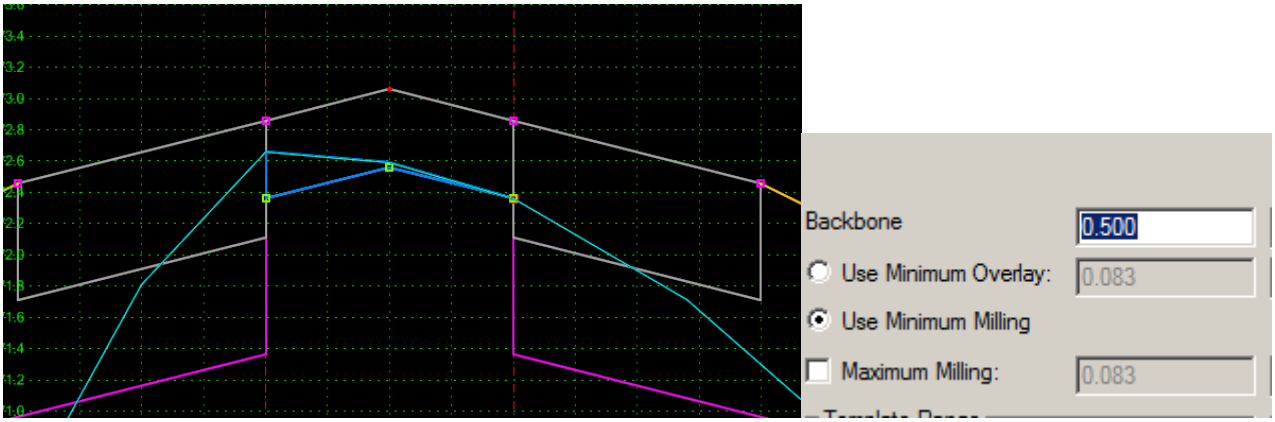


Other settings and results are shown below.

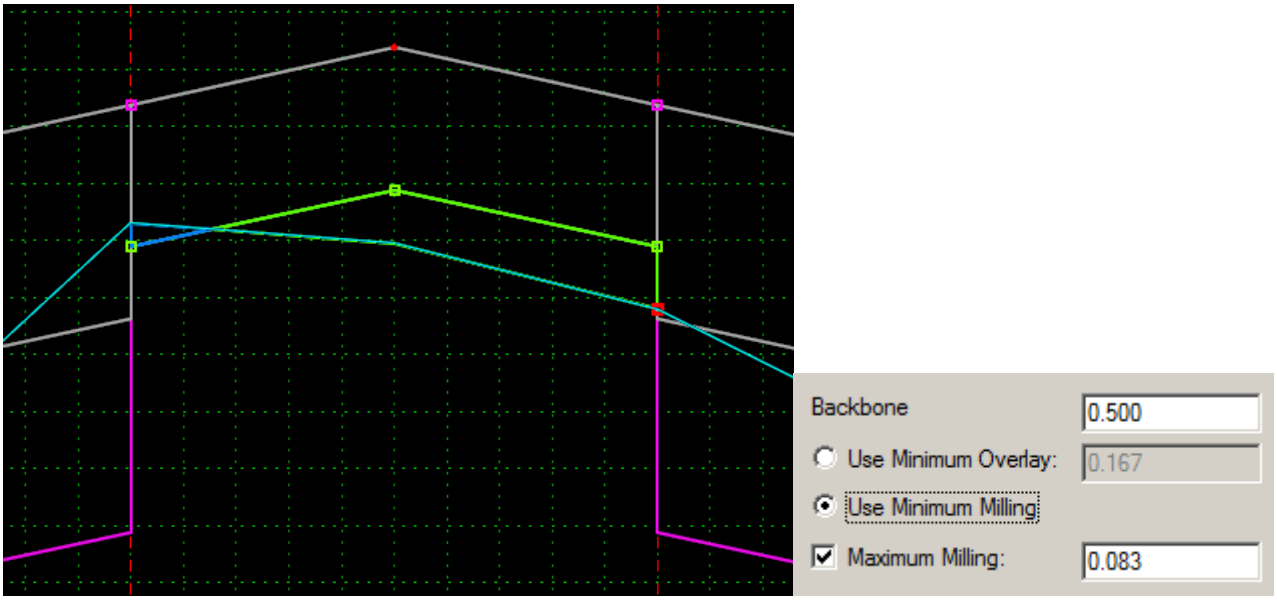
Constant Milling (Constant Milling Template Only).



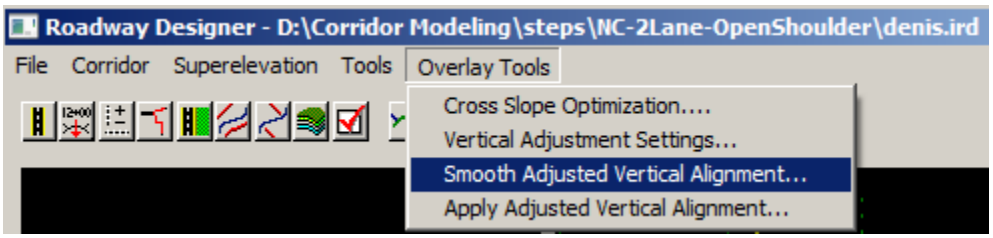
Use Minimum Milling (Variable Milling Template only).

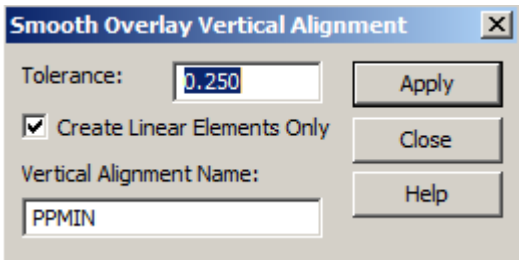


Maximum Milling (Variable Milling Template only).



9. Smooth Overlay Vertical Alignment





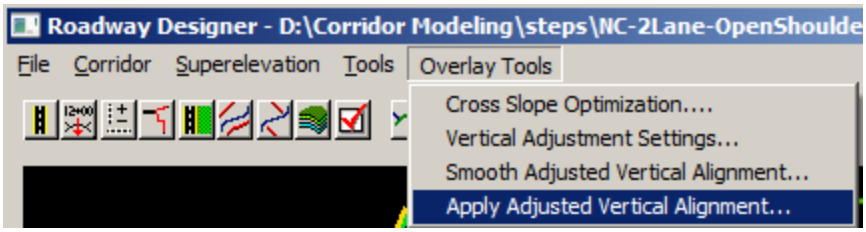
Tolerance

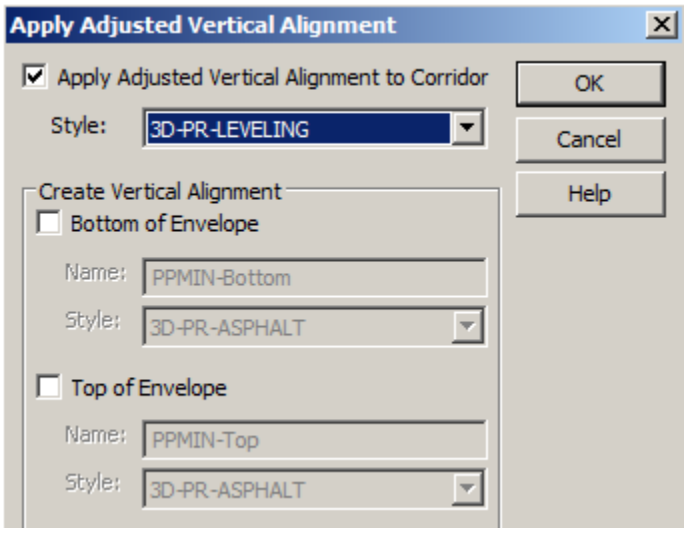
Sets the envelope (tolerance) for the smoothed vertical alignment. This value is the maximum allowable difference above (for minimum overlay) or below (for minimum milling) the ideal PGL line.

Create Linear Elements Only

When checked, creates only linear elements (tangents). When unchecked, the software attempts to fit parabolic curves in where possible. Non-tangential vertical curves are possible within this solution.

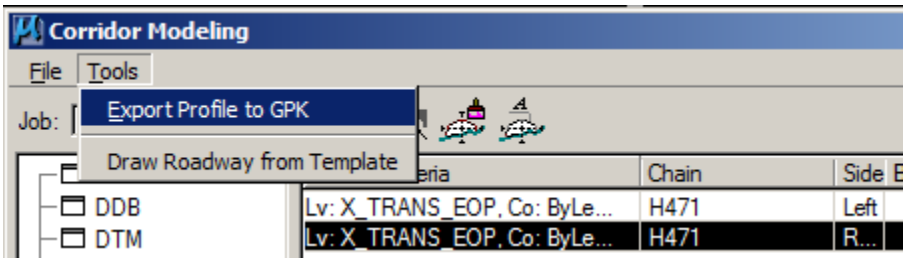
10. Apply Adjusted Vertical Alignment

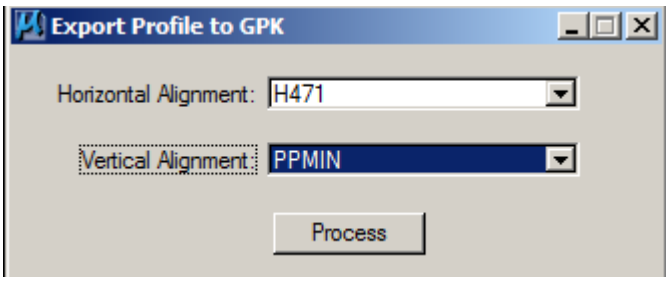




11. Export the profile to the GPK.

Go back to the Corridor Modeling dialog and choose Tools - > Export Profile to GPK





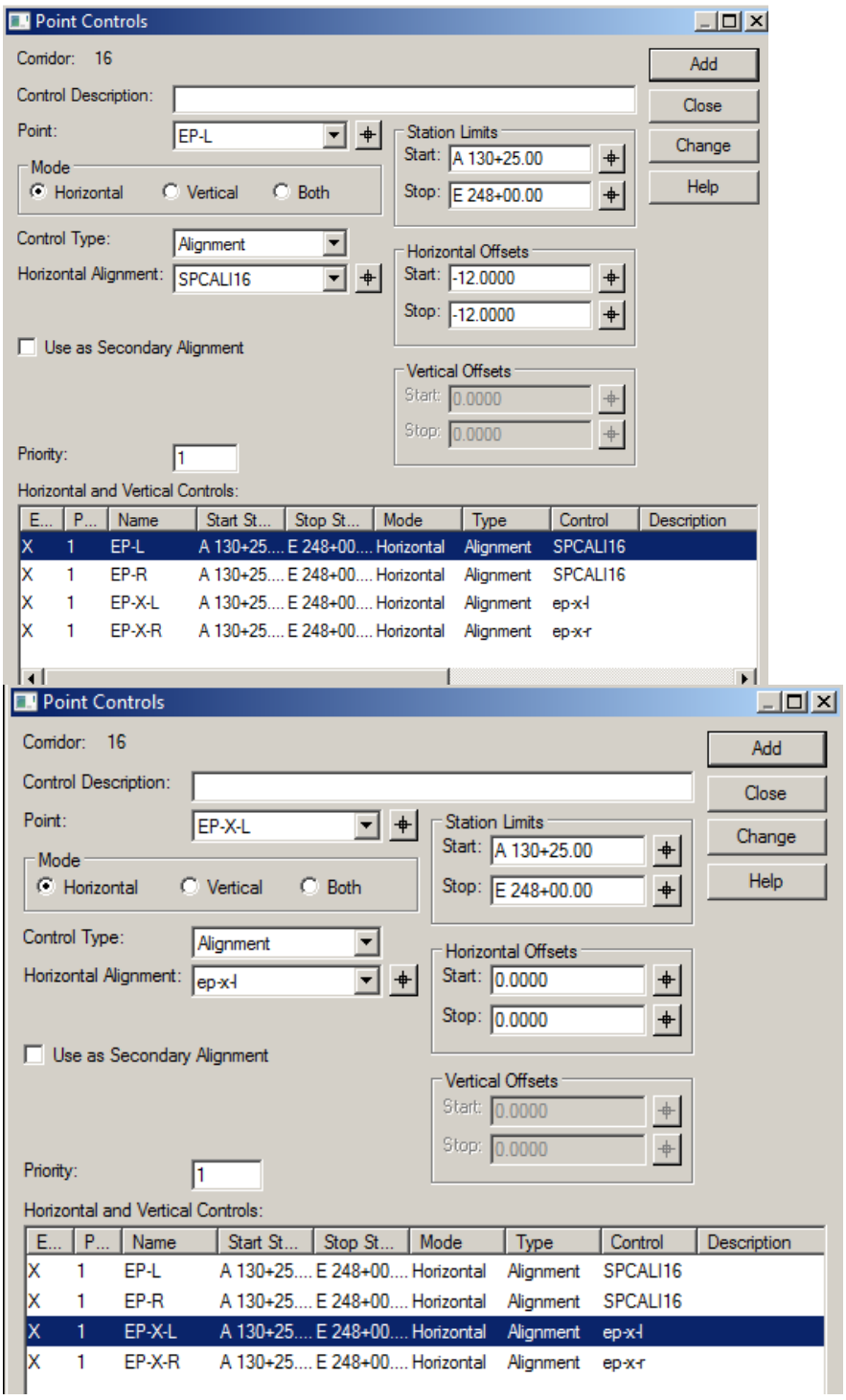
12. Plot this profile and smooth it with Bspline/Vertical curves ensuring you do not go below this line to ensure the minimum overlay specified. If you do, you'll be adding milling.

13. Use this profile in Proposed X-Sections or Corridor Modeling as the design profile.

Constant Overlays (or non-Super controlled slopes)

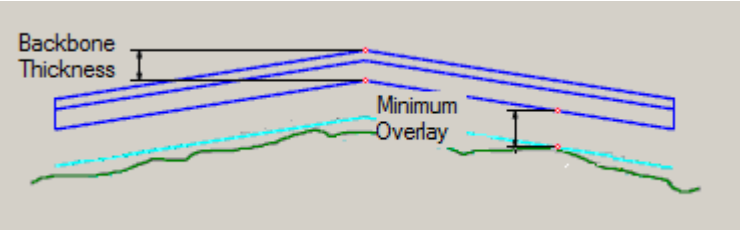
This picks up from Step 4 (Superlevation) above. This is where you are not controlling the slope with new super, you just want a constant overlay or you want to specify the design slope per station ranges.

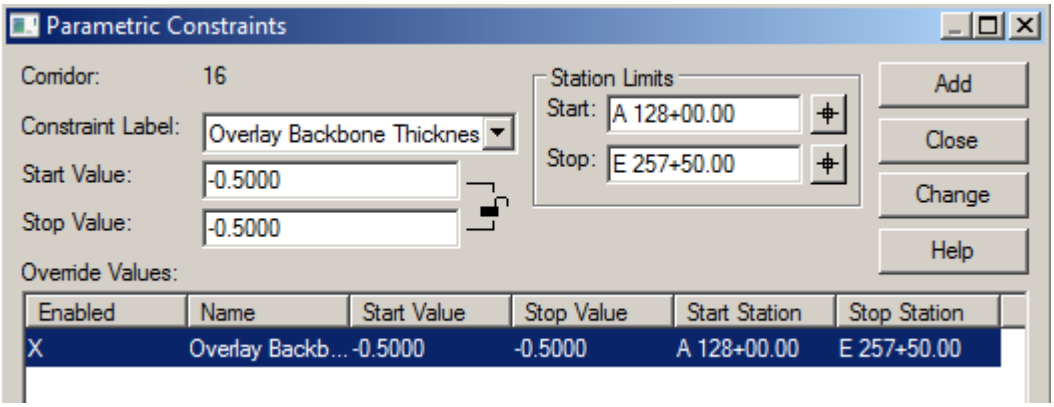
1. **Tag Corridor – Point Controls & Set Point Controls as shown below.**



2. Tag Tools – Parametric Constraints

At this time, the only parametric constraint that is required to be set is the Overlay Backbone Thickness (Pavement Thickness above Variable Overlay Thickness) although you can go ahead and set others if you wish.



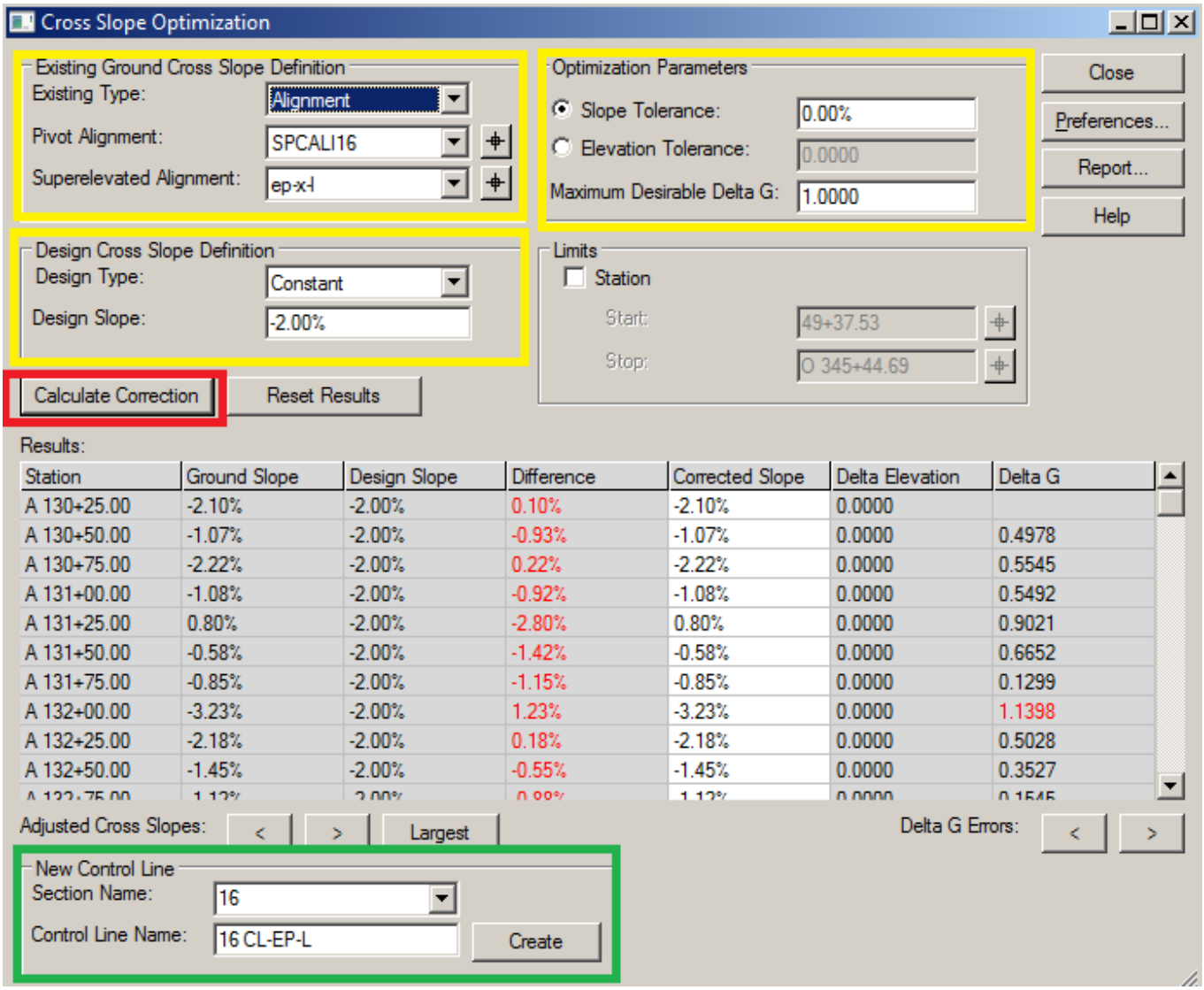


3. Tag Overlay Tools -> Cross Slope Optimization

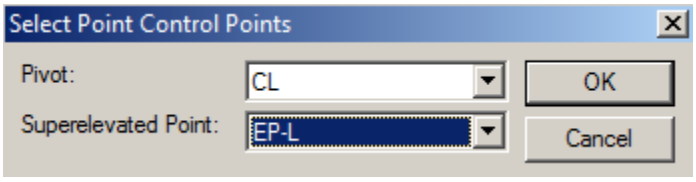
This tool looks at the xslope at every station specified by the Template Drop for one side of pavement. Make sure the Plan View Ex EP's are located within the DTM or XS Ex. Pavement Edges. Fill out the dialog as shown below: Yellow items 1st, Tag Calculate Correction 2nd, and then fill in the new control line info and tag Create.

In the example below, the "Corrected Slope" is equal to the "Ground Slope" which is what you would want for a Constant Overlay. If you wanted to change the Design Slope for specific Station Ranges, you would change the "Slope Tolerance" to something greater than 0%. In other words, if I changed it to 10%, all the "Corrected Slopes" would fall in the slope tolerance and would become the Design Slope which is -2%.

Left Lane

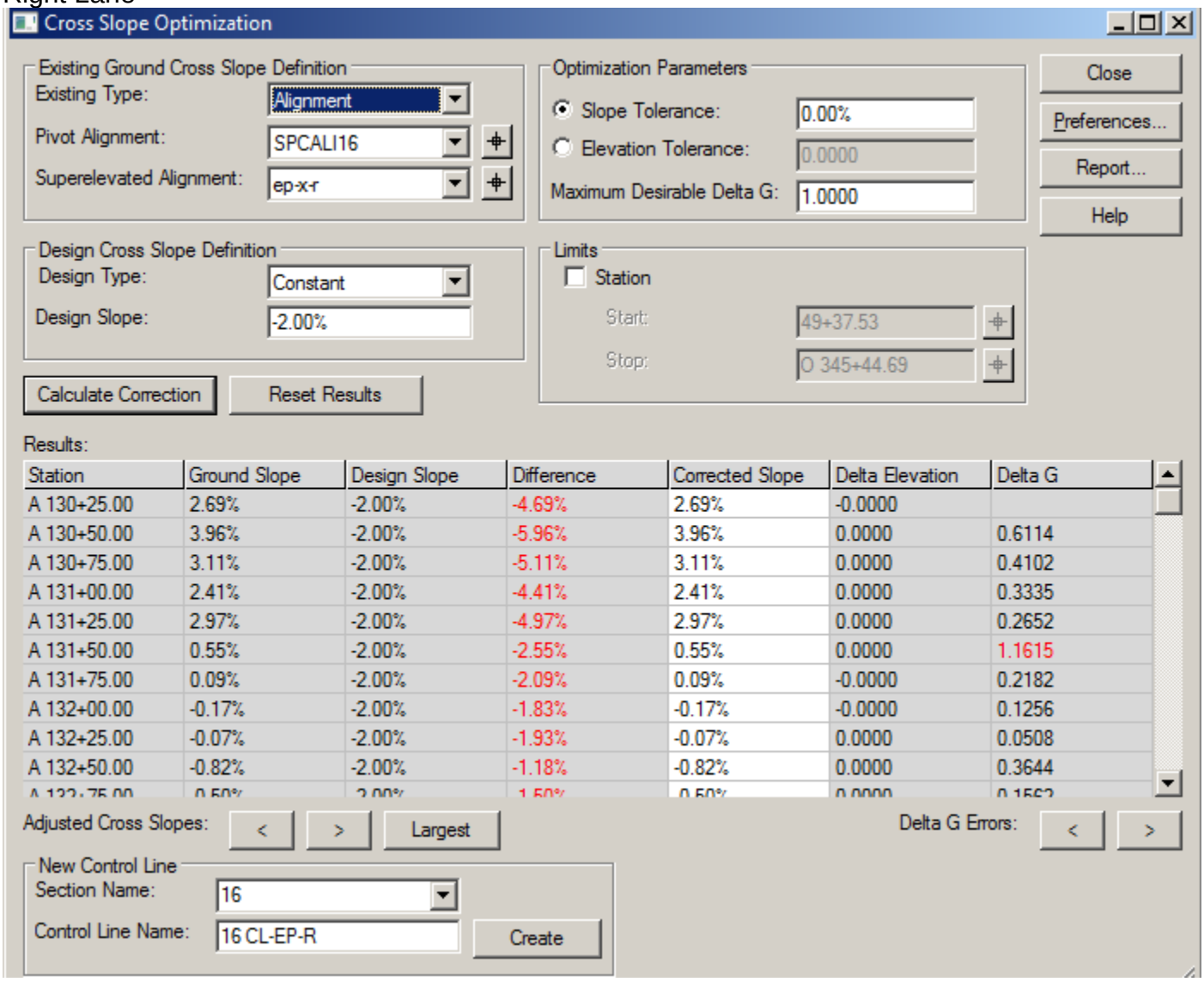


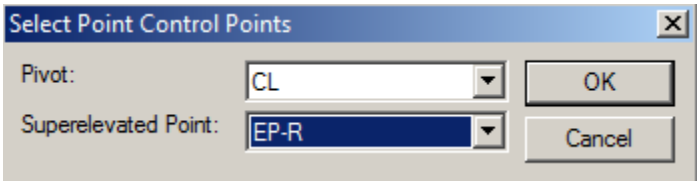
You will be prompted to Select Control Points:



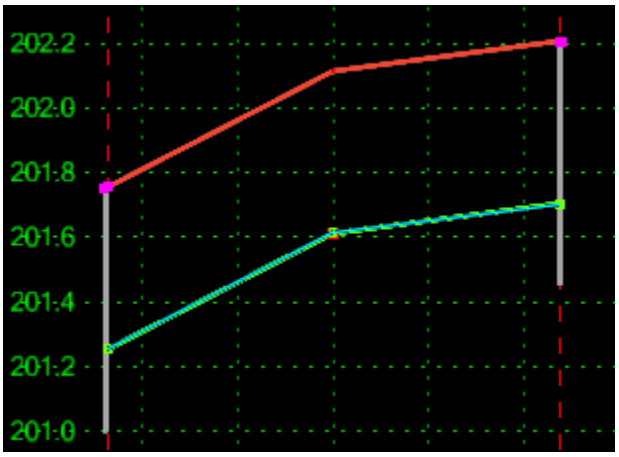
Tag Reset Results and redo for the other side of pavement:

Right Lane

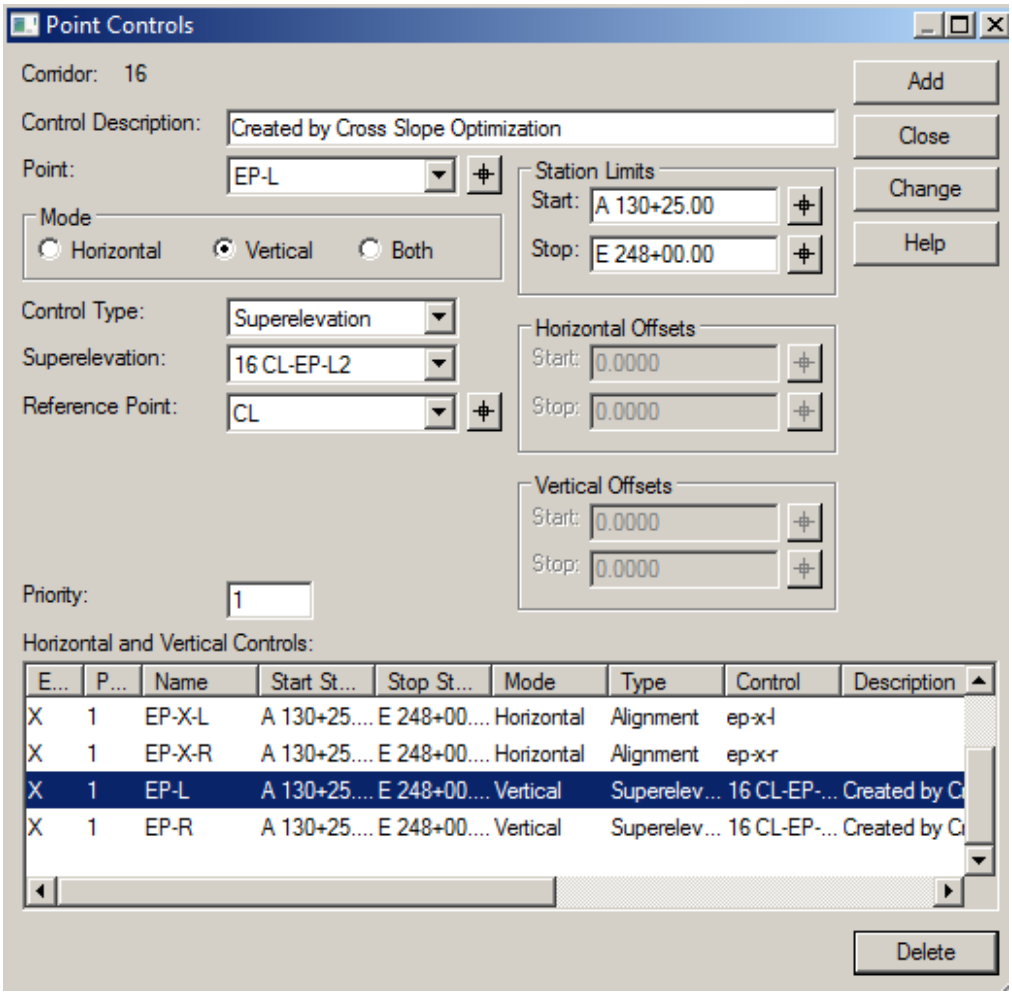




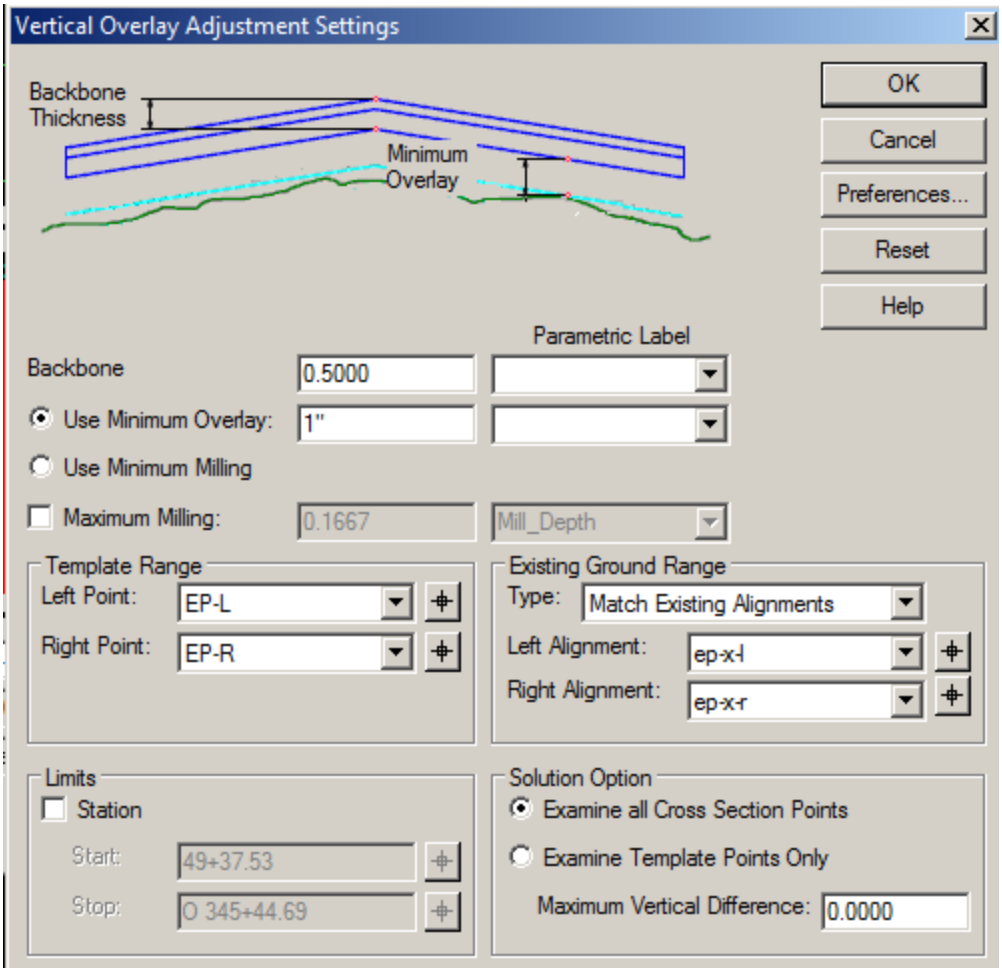
4. Close the Slope Optimizaton dialog. You should note that the proposed slopes should be following the existing slopes now.



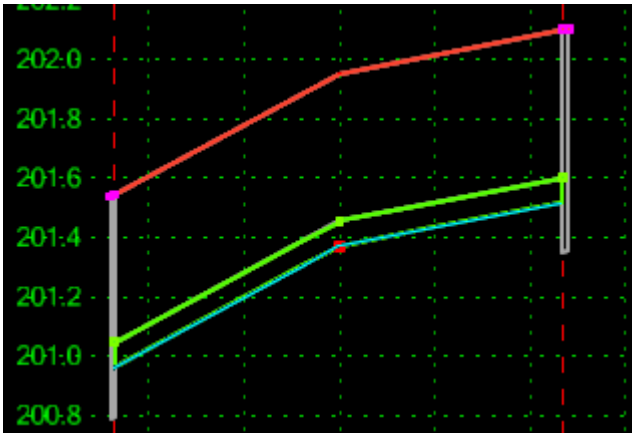
Step 3 also added Superelevation Control Points to the Point Controls dialog:



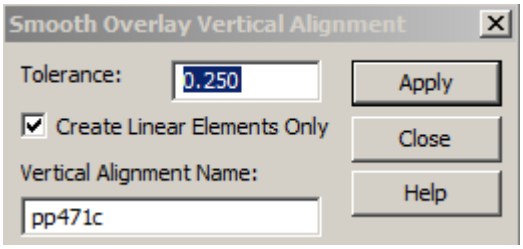
5. Tag Overlay Tools -> Vertical Adjustment Settings and fill out as shown below:



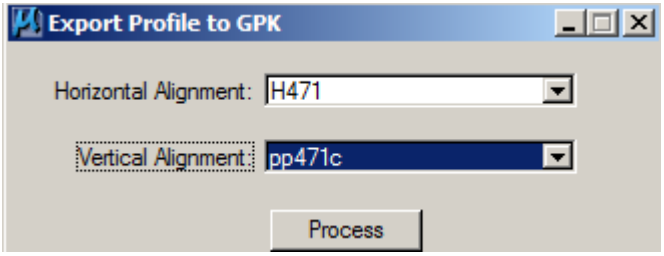
6. You should now notice your templates have a 1” overlay as specified above and are following the existing slope for a constant overlay or the design slope you specified.



7. Tag Overlay Tools -> Smooth Adjusted Vertical Alignment



8. Export the Profile to the GPK



9. Reimport the Alignment with this profile through Corridor Modeling. Choose the same template run and add the appropriate template, point controls (leaving the superelevation ones created earlier the same), Parametric Constraints, etc.